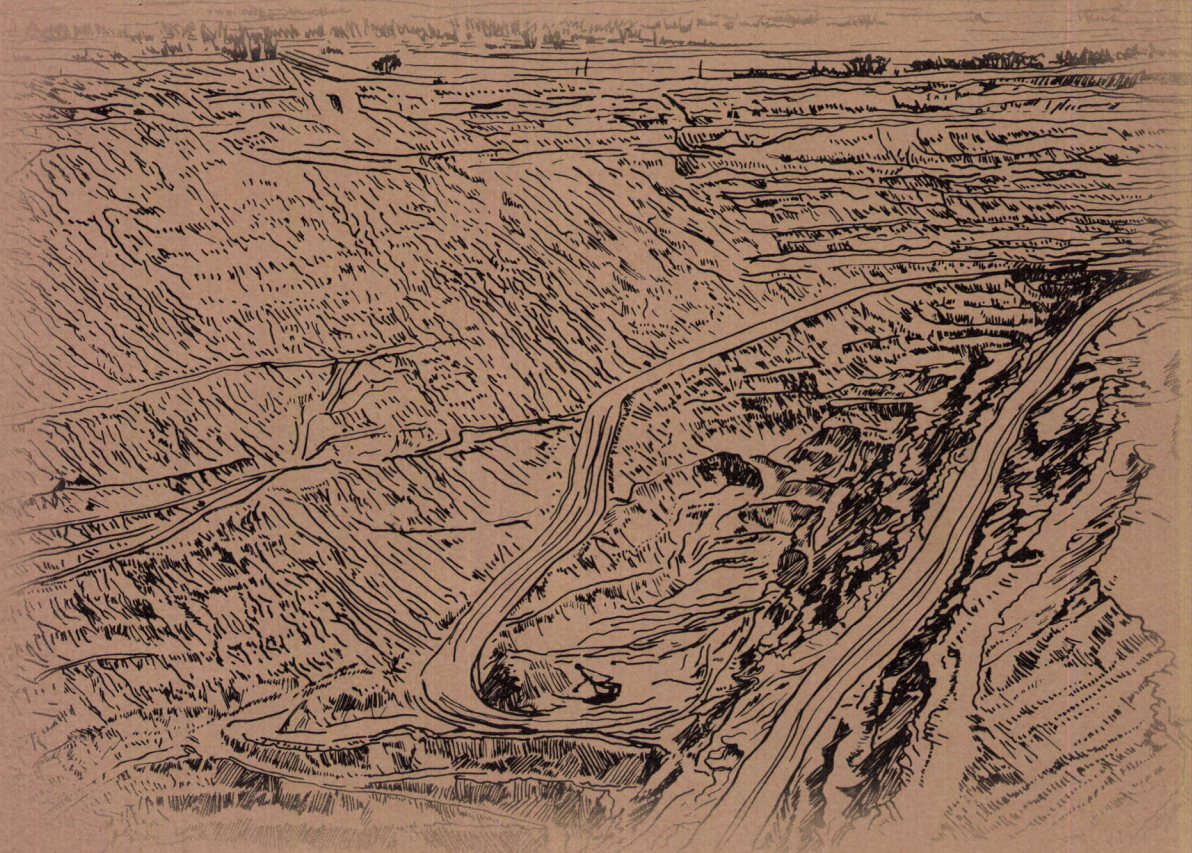


Hard Rock Mining on the Public Land

Council on Environmental Quality

1977



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On the cover: An open pit copper mine near Yerington, Nevada, on what was once public land.

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Council of Environmental Quality
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Written by David Sheridan
Illustrated by Margaret Lizbeth Carr

Preface

In his Environmental Message to Congress, President Carter called for major reform of the federal law governing hard rock mining on the public lands. The President noted that the Mining Law of 1872 is "outdated and inadequate" because it fails to set forth clear authority for establishing environmental standards, ignores the need for balanced management of resources, and does not require payment to the public treasury for the development of public resources.

Accordingly, the President proposed replacing the Mining Law of 1872 with new legislation. The Secretary of Interior submitted such a bill to the Congress in September 1977.

The Council on Environmental Quality sponsored this report, *Hard Rock Mining on the Public Land*, to enrich the public debate on the Mining Law of 1872. The report's purpose is to penetrate the myths and misconceptions which so often surround the subject of hard rock mining and to provide citizens and the Congress with an accurate, up-to-date synthesis of the information and views relevant to the issue of hard rock mining on the public's land.

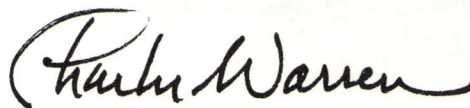
The Mining Law of 1872 has evolved over the years through legislative, administrative, and legal actions, but, as this report shows, it remains an anachronism. The Law does promote private exploitation of the mineral wealth of the public land; indeed, that was the original and sole intent. Today, however, efficient and equitable management of public resources is more complex; it requires that mineral exploitation be considered an objective but not *the* objective.

Other objectives which are *not* met under the present law are delineated in this report:

- Multiple use of the public lands
- Environmental protection
- A fair market return to the public
- Retention of public ownership
- Efficient allocation of resources
- Energy conservation
- Competition in the mineral industry
- Adequate information for public decisionmaking.

Hence, reform of the 1872 Law is necessary and is long overdue.

The major finding of this report is that the Law can be reformed to incorporate the objectives cited above while still providing an adequate incentive to private enterprise to explore for and mine minerals—a key factor in filling the nation's mineral needs.



CHARLES WARREN
Chairman

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Foreword

Lands owned by the public and managed for us by the federal government contain mineral wealth. It certainly is within our interest to have those minerals mined if their worth exceeds the full cost to society of producing them.

This report analyzes the current government policy for developing hard rock mineral wealth and seeks to identify the crucial objectives which should guide such a policy—whatever it may be. Deficiencies in the current policy are revealed. The emphasis here is on exposition rather than

prescription, although alternative courses of action are cited.

Because of the rich and varied opinion already expressed on how the government should manage the hard rock mineral exploitation of the public land, an effort is made throughout this report to air differing viewpoints—industry, environmentalists, etc. By so doing, it is hoped that the areas of agreement, not just those of conflict, become clearer.

Chapter I

How It Works

The general mining laws extend an express invitation to enter [the public lands] and explore and, upon discovery, to claim by location with the promise of full reward. This is the free enterprise system in action.¹

—U.S. FOREST SERVICE, 1975

Roughly one-third of the land in the United States is owned by the public. Of these 743.2 million acres, about 68 percent is open to hard rock exploration (the modern term for prospecting) and mining.*² In fact, miners have free access to these public lands.

For purposes of public policy analysis, the key word here is "free." That is, the miner can go onto these lands and drill or dig for copper, zinc, gold, uranium, or any other hard rock mineral, and no permit, license, or fee is required of him by the owners' agent—the federal government. If the miner locates a "marketable" ore body which is unclaimed, he can stake a claim to it. The claim also gives him free use of the land above and adjoining the deposit.³ Then the miner is free to dig the ore and sell it. He pays no royalty to the owners. The miner can also use surface resources on the claim, such as timber and water, free of charge for mining purposes. On the land, the miner is free to build any structure, a mill, an office, a shed, or whatever, as long as it relates directly to the mining operation. No rent is paid the owners.

To hold his claim from year to year, the miner need only do \$100 worth of work upon it.† Most mining claims are never mined. They are held for speculative purposes. Individuals or small companies hold onto their claims, perhaps for years, in the hope that a large mining company will come along, do a professional assessment of their claims' mineral potential, find something worth mining, and then buy them

out. It is easy enough to stake a claim. At present, you need only file a simple location notice at the nearest county courthouse and post a copy of the notice at the site.⁴ (When the Federal Policy and Land Management Act of 1976 is implemented, miners will also have to file claims with the local Bureau of Land Management office.)

Further, by applying for a patent from the Department of the Interior, the miner can seek outright ownership of his mining claim. If the patent is granted, the land is his, not the public's. The miner pays the public either \$2.50 per acre (if it is a placer deposit) or \$5 per acre (if it is a lode deposit) for the land, which is probably one of today's great real estate bargains.⁵

These are unique privileges the miner possesses. The other major commercial users of the public lands do not have free access. Lumber companies, for example, are allowed to cut in designated areas, usually after competitive bidding, and they of course pay the going market price for the timber which they remove. Ranchers can graze their livestock on the public lands—but only after receiving a permit which specifies the number of livestock to be grazed and the area. The rancher must also pay a fee for use of the public's rangeland. Passage of the Taylor Grazing Act of 1934 ended the rancher's unlimited access to the public lands; the lumber companies' unlimited access to the National Forests ended in 1897 with the Organic Administration Act. So long as the Mining Law of 1872

* Includes the temporary land withdrawals in Alaska under the Alaska Native Claims Act.

† Congress amended the General Mining Law in 1958 to permit geological, geochemical, or geophysical surveys to satisfy the annual labor requirement.

remains intact, the hard rock miner will have free access to the public domain.

Miners enjoy no such privileges on privately owned land, however. To explore on private land, a miner must first get permission from the landlord, and often he is required to pay a fee of some sort for exploration rights. If a mineral deposit is discovered, then either the miner will have to lease the mineral rights from the owner, in which case he will have to pay a royalty on production and probably a rent for use of the land, or the miner must buy the land and mineral rights outright at the going market price.

A common arrangement is for a mining company to take an option on a mineral property

when it obtains exploration rights. And then if an ore deposit is discovered, the company exercises the option, paying the amount already agreed upon, and, if the deposit is developed, the company pays the original owner a percentage of the profits or of the gross from that mine.

Most states require some kind of permit for mineral exploration on state-owned lands. Then, if a deposit is found, they lease the mineral rights, requiring a royalty payment on production. The notable exceptions to this approach are Alaska and Arizona, which operate both a location system and a leasing system, depending on the category of land involved, for state-owned lands.

Chapter II

A Very Brief History

During the time it took Congress to pass any legislation at all, miners had simply gone ahead and appropriated the mineral resources they discovered on the public lands. . . It is to the credit of Congress that the framework it finally established [in 1872] incorporated existing reality and assured a minimum of interference with the lusty development of the nation's mineral resources already underway.⁶

During its first 83 years, the United States did not have an explicit and coherent mineral policy for the public lands. Officials such as Alexander Hamilton advocated the sale of mineralized lands on the public domain because of the money it would bring into the U.S. Treasury. But during the early days of the Republic, minerals such as iron and lead were leased more often than not, and the public retained ownership of the land or sold it later for farming. Administration of the public lands, however, was lax. It was not until 1845, for instance, that unauthorized mining on the public domain was established to be an actionable trespass (*United States v. Gear*).⁷

As the country expanded, so did the belief that land was an unlimited asset and if public it should be disposed of as rapidly as possible in the interest of development and exploitation "in order that all might prosper." Increasingly, mineralized lands on the public domain were sold to private interests, often at extremely low prices. Such was the case with the extensive copper and iron ore deposits in Michigan and Wisconsin. And in the rush to dispose of public mineral resources, "gross fraud" was not uncommon.⁸

With the California gold rush of 1848 and the western mining boom which followed, events moved too swiftly for the distant federal government to affect their course. (Needless to say, the environmental impacts of mining were not a consideration in those days. That does not mean, however, that they were insignificant. The abundant flora and fauna of San Francisco Bay were ravaged by polluted waters flushed out of gold mines and mills, for example, and they never recovered.⁹)

By the time Congress finally acted, passing the Lode Law of 1866, in reality it could do little else than "legalize what would otherwise have been a trespass," which is what it did.¹⁰ The miners had already appropriated the mineral resources on the public land as well as the surface resources above them. Interestingly, even at this early date, mining on the public land was mostly done under the supervision of trained mining engineers and was financed by wealthy investors in this country and England. Except for the early California gold rush days, the individual miner—the mythologized prospector riding a burro—never profited greatly from the exploitation of minerals on the public lands.¹¹ The Lode Law of 1866 was amended by the Placer Act of 1870, and the two were consolidated in the Mining Law of 1872. Although hardly a model of legislative draftmanship (almost every term in it has been the subject of controversy and litigation), the Law's purpose is abundantly clear:

To promote the mining resources of the United States.

And this is the sole purpose of the 1872 Mining Law. No mention is made in it of the nonmineral uses of the public lands, be they grazing, hunting, fishing, or whatever. The 1872 Mining Law is based on a single premise, one which dates back to Roman times: Mineral exploration and development should have preference over all uses of the land because they are the highest economic use of the land. To quote a prominent geologist, Charles Park:

Minerals are where you find them. The quantities are finite. It's criminal to waste materials when the

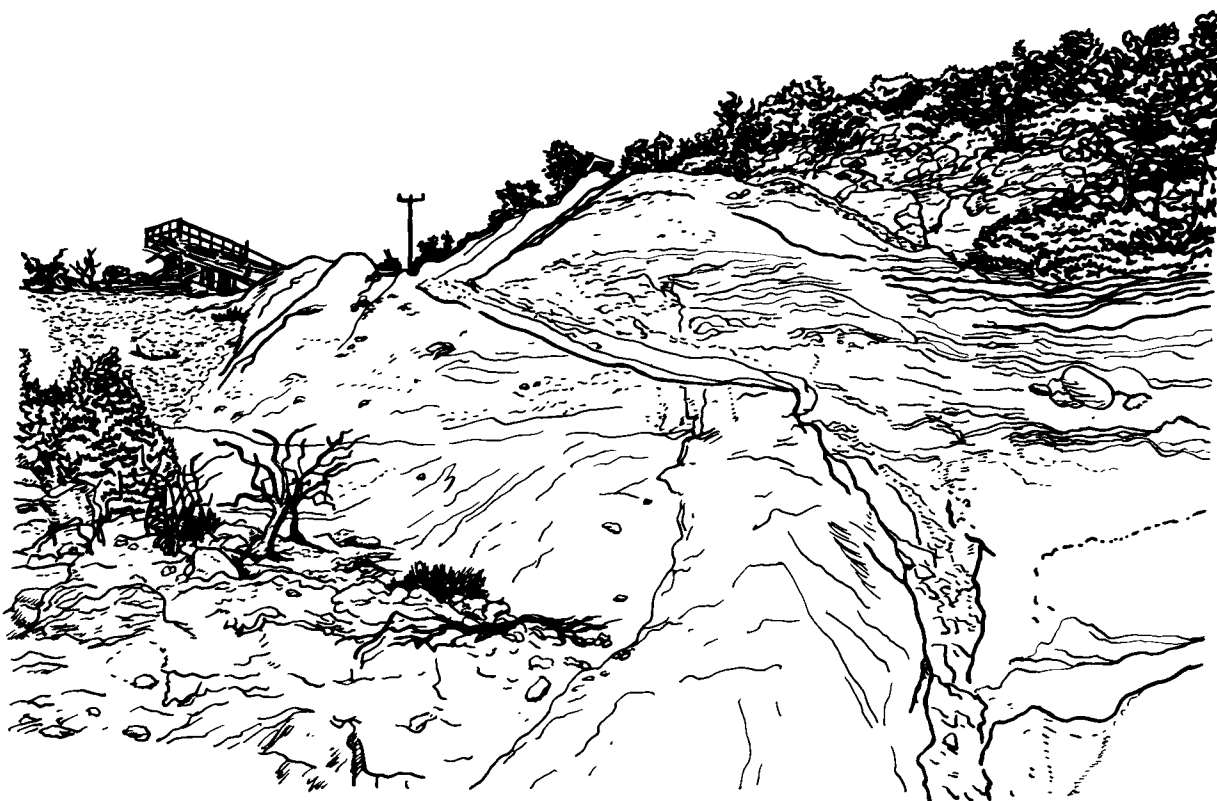
*standard of living depends upon them. A mine cannot move. It is fixed by nature. So it has to take precedence over any other use.*¹²

The policy of promoting mining has deep historical roots. Under Germanic law of the 13th century, at a time when agricultural workers were shackled by feudal serfdom, miners were a skilled and privileged class who enjoyed considerable freedom. To encourage mining, the overlords permitted miners to go upon "wastrel" lands and stake out claims. Upon discovery of a vein or other mineral deposit, the miner obtained a permanent concession to hold and work this property, subject only to continued payment of royalties to the overlord (usually one-tenth of production). The most important feature of this system was the overlord's relinquishing his right to select personally those who might mine the wastelands of his jurisdiction. The rights of the miner subsequently spread into other parts of Europe and eventually reached the western United States of the last century.¹³ In Europe, the increasing power of the monarchy gradually

intruded upon the miner-overlord relationship. In 1568, in the famous case of *Mines*, the English Royal Solicitor argued with exceptional candor that

*the common law, which is founded upon reason, appropriates every thing to the persons whom it best suits, as common and trivial things to the common people, things of more worth to persons in a higher and superior class, and things most excellent to those persons who excel all others; and because gold and silver are the most excellent things which the soil contains, the law has appointed them (as in reason it ought) to the person who is most excellent and that is the King.*¹⁴

In the United States, this interpretation never took hold. Here, on a continent whose mineral resources were still to be discovered, a laissez-faire policy of "finders keepers" became the rule. More and more often during the second half of the 19th century, the "finders" of mineral deposits sold them to mining corporations, which possessed the wherewithal to mine and process



Polluted runoff from an underground vanadium mine on BLM land winds down a hillside covered with waste rock from the mine.

the ore. These corporations became the "keepers" as they gained control over more and more hard rock mineral reserves—and thus were born

the oligopolies in copper, aluminum, nickel, iron, molybdenum, and other minerals of the 20th century.

Chapter III

The Evolution of Federal Mineral Policy for the Public Lands

Looking back over the history of the mining law and its administration—the application of its terms and the resolution of its almost total ambiguity—the trend of the law is clearly and unmistakably toward an ever-increasing conservatism. . . . The result is that what we are administering today is not the [1872] mining law, but the rather substantial body of legal and quasi-legal precedents which largely are of our own making.¹⁵

—H. R. HOCHMUTH
Associate Director of the
Bureau of Land Management,
1965

Since 1872 Congress, the administrative agencies, and the courts have been chipping away at the policy of free access to minerals on the public's land. To be sure, the change has been glacial at times, but the direction is unmistakable. Along the way, three federal government systems of mineral disposal have evolved.

The claim-patent (location) system, established by the Mining Law of 1872, still applies for hard rock mineral deposits on public domain lands, i.e., those lands which the United States obtained from other countries—Great Britain, Spain, Russia, and so on. The others include lease and sale systems.

LEASING

In 1920 Congress passed the Mineral Leasing Act. Under this system, the federal government retains ownership of the land and of certain minerals. The government has discretionary power to permit prospecting for development of these minerals under specified conditions in return for payment of certain fees—rentals, royalties, and, in competitive bidding situations, bonuses; limitations are placed on the number of acres any one company can lease in any given state. This kind of government control over mineral resources is the rule rather than the exception in most of the world.¹⁶ Minerals covered by the Leasing Act include: coal, oil, gas,

and oil shale; phosphates or phosphate rock; chlorides, sulfates, carbonates, borates, and silicates or nitrates of potassium and of sodium; sulphur in Louisiana and New Mexico; and native asphalt, bitumen, and bituminous rock.

The legislative history of the Mineral Leasing Act shows that Congress intended to prevent development of monopolies, to discourage holding mineral rights without development for speculative purposes, and to provide a return to the U.S. Treasury for the exploitation of public resources.¹⁷

It is important to note that according to the Department of the Interior, the leasing system does apply to hard rock minerals found on lands *acquired* by the federal government from private owners—some 56.3 million acres, or about 8 percent of the total area of the public's land.¹⁸ On these lands, hard rock mineral development is subject to prospecting permit and lease by the Secretary of Interior. For example, there exists an active program for leasing lead deposits on acquired lands in Missouri (with a production value of over \$42 million in 1972). The regulations implementing this system follow those established for leasing nonfuel minerals under the 1920 Mineral Leasing Act. Prospecting permits, issued for a term of 2 years, give the permittee exclusive right to explore the designated area for the mineral being sought. Upon discovery of a

valuable mineral deposit, the permittee is entitled to a preference right lease (usually for 20 years). The royalty rate for lead and associated minerals is 4 percent for the first 10 years, 4.5 percent for the next 5, and 5 percent for the remaining 5.¹⁹

In other words, private mining companies do in fact explore for and produce hard rock minerals on the public's land under either system—claim-patent or leasing. From 1967 through 1974, mining companies produced \$13.2 million worth of copper from public land (acquired) and paid royalties to the U.S. Treasury of \$536,513. They produced \$15.6 million worth of fluor spar (1948-74) from public land (acquired) and paid royalties of \$594,759. Mining companies produced \$298.5 million worth of lead and zinc (1961-74) from public land (acquired) and paid royalties of \$12.2 million to the U.S. Treasury.²⁰

SALE

Under the Materials Disposal Act of 1947, the federal government can sell such materials as sand, gravel, stone, and clay which are on the public land, but the public retains ownership of the land. The Act was amended by the Multiple Surface Use Act of 1955, which removed certain common varieties of sand, stone, gravel, pumice, pumicite, and cinders from coverage under the Mining Law of 1872.

We have seen how the Congress has altered mineral policy for the public's land since 1872. So too have the courts, especially in regard to the difficult matter of what constitutes the discovery of "a valuable mineral deposit," for it is this which determines whether or not a mining claim staked under the Mining Law of 1872 is valid. For many years, the courts used the "prudent man" rule requiring "evidence of such a character that a person of ordinary prudence would be justified in the further expenditure of his labor and means, with a valuable mine..." But in *United States v. Coleman* (1968), the Supreme Court introduced the "marketability rule" as a "logical complement to the prudent man rule." A patent applicant must prove that he has discovered a deposit of minerals which can be mined and marketed at a profit under the economic conditions at the time of application.²¹

The Department of the Interior has also become much stricter in its granting of patents. The flood of patents given in the 1872-1913 period has dwindled to a trickle. From 1872 through 1975, the United States issued 64,229 mineral patents, which disposed of 2.9 million acres of the public's land, an average of 624

patents and 28,050 acres per year. From 1968 through 1975, however, the United States issued 207 mineral patents, which disposed of 27,992 acres of the public's land—an average of 25.9 patents and 3,499 acres per year.²²

One observer noted that applying for a patent today on a mining claim is "like inviting the Internal Revenue Service to audit your tax returns."²³

Hochmuth summarized the evolution of the 1872 Mining Law thusly:

*There can be no gainsaying that the Mining Law of 1872 is not administered as it was originally written and intended. There has been a definite trend in decisions toward more stringent requirements to establish the validity of a claim. The requirements are innovations which have been superimposed on the basic law by the need for standards which can serve to prevent the subversion of the law for nonmineral purposes. Examples of these may be found in the narrowing application of the rule of discovery, the employment of the rule of marketability, the definitions of "common varieties," and the concern for economic values...*²⁴

He concluded that the "mining law has been converted from an expression of laissez-faire to an instrument of regulation." This assertion is exaggerated and extremely misleading, however. Except in the area of granting mineral patents, there is no evidence to suggest that the Law has become "an instrument of regulation." To the contrary, available evidence suggests that laissez-faire is still very much in force when it comes to staking mining claims on the public domain under the terms of the 1872 Mining Law.

For example, in an investigation of 240 randomly selected claims in mining districts in Arizona, California, Colorado, and Wyoming, the General Accounting Office (GAO) found that only one was actually being mined. There was evidence on only three claims that minerals had ever been extracted.²⁵ This author's random observations of mining claims in Nevada and Utah and interviews with Bureau of Land Management (BLM) and Forest Service personnel indicate a similar pattern in those states as well. Most mining claims appear to be held for speculative purposes and not for the development of mineral resources.

The vast majority of claims are never checked by federal administrative agencies to determine whether a "discovery of a valuable mineral" has been made. No one knows for sure how many mining claims have been staked on the public domain—though they certainly number in the

millions. An administrative-legal process does exist for invalidating illegal claims, but it is very cumbersome and expensive and is usually instigated by the federal government only in cases of flagrant violation, e.g., someone builds a resort on his mining claims or uses the claimed land as a junkyard. (Neither of these instances is apocryphal; they happened.)²⁶

A continuing administrative headache for BLM and the Forest Service is the use of mining claims for nonmineral purposes. The system itself seems to invite abuse. It is so much easier to go out and stake a mining claim on the public's land and build, say, a home on it than it is to have to buy land from a private owner. These abuses are well documented.²⁷

The Congress has sought to remedy this situation through such measures as the Mining Claims Occupancy Act and the Surface Resources Act. Indeed, the Surface Resources Act of 1955 represents the first significant legislation in which Congress asserted its authority over the public land vis-à-vis the miner:

*Any mining claim hereafter located under the mining laws of the United States shall not be used, prior to issuance of patent . . . for any purposes other than prospecting, mining or processing operations and uses reasonably incident therein.*²⁸

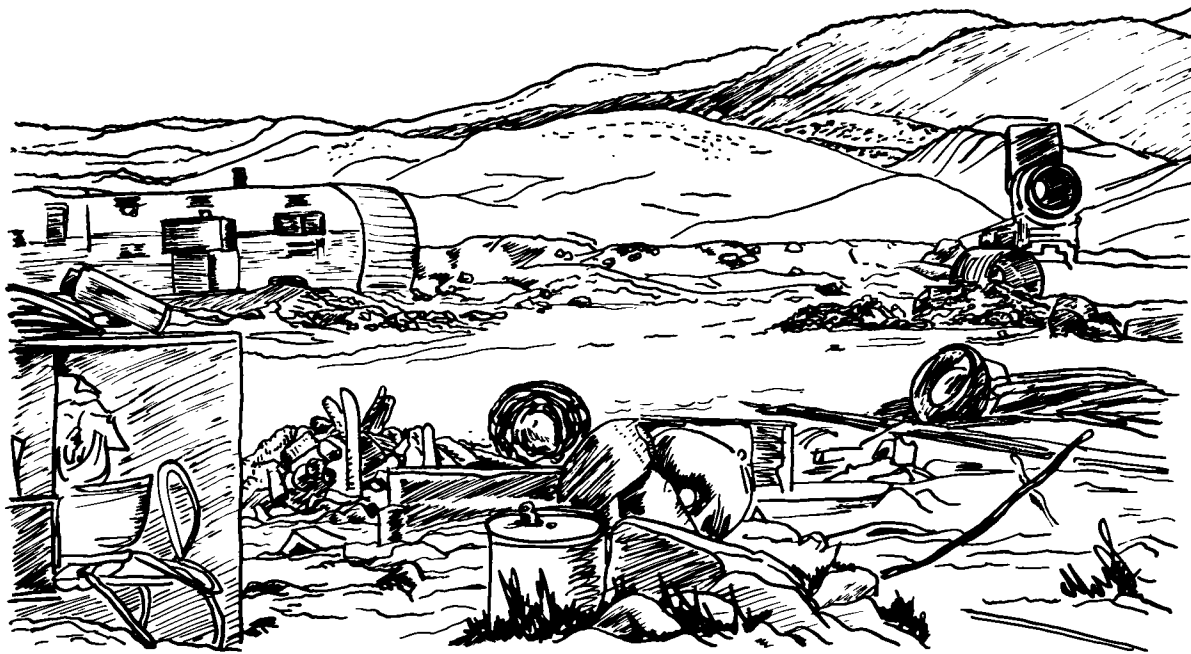
Nevertheless, the abuses continue, although BLM and the Forest Service believe they are on

the wane. But these agencies are responsible for vast expanses of land and due to their limited resources—personnel and money—they have not been able to eliminate the problem. The Forest Service reported nearly 2,000 cases of “questionable occupancy on its land,”²⁹ and there may well be even more on BLM lands. It is difficult and expensive to dislodge these squatters, according to BLM and the Forest Service.

To get some notion of the difficulties involved in regulating mining claims, consider the Department of the Interior's program to clear the titles to mining claims on oil shale lands in Colorado, Utah, and Wyoming. Between September 1968 and February 1974, Interior spent over 100 man-years and \$1.9 million on this effort; yet approximately 50,000 claims identified as of February 1974 still have to be cleared.³⁰

The Federal Land Policy and Management Act of 1976 (the BLM Organic Act) for the first time requires that mining claims be filed with the federal government. (Persons with claims which predate the Act have 3 years to file their claims with the federal government.) This measure should make the administrative task of keeping track of mining claims on the public domain possible. The problem of determining whether a claim represents “the discovery of a valuable mineral deposit” will remain, however.

It is perfectly legal, of course, for the holder of a mineral patent to do with the once public



BLM land near Dayton, Nevada, where squatters are allegedly mining gold.

land what he will. Throughout the western United States, land acquired through mineral patents is used for all manner of nonmineral

purposes—including trailer parks, housing developments, drive-in movies, shopping centers, and occasionally even a house of prostitution.

Chapter IV

Attempts To Reform or Repeal the Mining Law of 1872

[R]epeal the unadministerable and environmentally devastating Mining Act of 1872 and place all "hard rock" minerals under the Mineral Leasing Act of 1920. . . Why should the mining industry have any special right? That Act gives the mining industry a special right over and above anybody else. . . We are suggesting simply that they compete on an equal basis.³¹

—CHARLES STODDARD
Resource Consultant and former
Director of the Bureau of Land
Management, 1970

The open access to minerals on public lands is one of the few remaining vestiges of our former national policy.³²

—ROBERT C. ANDERSON
Economist, 1976

With little aid from the courts, the industry must rely on legislative reform to solve its problems. But will Congress be content to amend the 1872 law, or will it abolish the system altogether? Therein lies the problem, and so the mining industry clings fervently to an outmoded law, preferring the troublesome present to an unknown future.³³

—RICHARD W. HARRIS
Attorney, 1975

Despite the changes which the 1872 Law has undergone at the hands of the Congress, the judiciary, and BLM and the Forest Service, the pressure to reform or repeal the law has mounted in recent years. Every session of Congress since 1969, for instance, has seen legislation proposed to scrap the claim-patent system in favor of some form of leasing.

Three prestigious commissions—the Hoover Commission (1949), the Paley Commission (1952), and the Public Land Law Review Commission (PLLRC)—have all recommended specific reforms in the 1872 Law. None, however, has been adopted due to the lack of consensus in Congress on this issue.

Because it is the most recent and most thorough analysis of public land policy, the PLLRC's proposed changes in the Act are summarized here:

- Require an exploration permit whenever equipment that would be damaging to the environment is used.
- Permit the land management agencies to establish environmental safeguards for mineral development and mining.
- Impose royalty charges on production of minerals.
- Subject minerals to competitive bidding whenever competitive interest can be reasonably expected.

- Permit the miner to obtain a patent only to the mineral deposit and such area as is necessary for production.³⁴

In other words, the PLLRC favored continuation of the claim-patent system after some major surgery. It reaffirmed the basic tenet of the 1872 Act—"mineral exploration and development should have a preference over some or all other uses on much of our public lands."

The PLLRC's recommendations failed to attract any substantial political support except among the large mining companies, however. (Generally, small miners have opposed any change in the 1872 Law.) Commission member Maurice K. Goddard, Secretary of Environmental Resources for the state of Pennsylvania, offered this explanation:

*I am frankly convinced that these are minimal acceptable changes to the Mining Law of 1872. In fact, I think a lot of people looked at the report, saw that the Commission did not recommend repeal of the law of 1872, and decided immediately that the report was no good without reading any further. That's how strongly some people feel about this law.*³⁵

Representative Aspinall of Colorado, then Chairman of the House Interior Committee and of the PLLRC, and Senator Bible of Nevada introduced the Mineral Development Act of 1971 (H.R. 10640 and S. 2542), which incorporated most of the PLLRC's recommendations and drew support from important segments of

the mining industry. But Representative Aspinall was defeated in the 1972 primaries and Senator Bible did not reintroduce the bill "due to the intense opposition expressed by small miners and prospectors throughout the West."³⁶

There is dissatisfaction with the 1872 Law from many sides for numerous and varied reasons. In reviewing testimony before Congress on this subject, one notes with interest that organizations representing the other major users of the public lands—the lumber industry, the ranchers, the hunters and anglers, as well as other outdoor people—have all supported reform of the Mining Law of 1872. It is an issue which makes for unlikely allies, such as the National Forest Products Association and the Sierra Club.³⁷ The bulk of the dissatisfaction seems to boil down to three fundamental criticisms:

- The Law does not require any return to the public for the exploitation of public resources.
- The Law does not control the environmental damage caused by mineral exploration and mining on the public lands; nor does it prevent mining and exploration in areas where the environmental costs might be massive and irreversible.
- The Law does not balance the nation's need for minerals against other needs—for timber, water, rangeland, recreation—in a manner consistent with the multiple use philosophy which is supposed to govern the management of our public's land.

FAIR RETURN TO THE PUBLIC

*Much of the mining industry is on record as being willing to pay a reasonable production royalty.*³⁸

—STAN DEMPSEY

AMAX, Inc. (molybdenum, tungsten, nickel, copper, zinc, cadmium, gold, silver), 1976

The federal policy regarding payment for the use of resources lacks both equity and logic. To go on to the Toiyabe National Forest to harvest piñon nuts, for instance, you must buy a permit, but the gold or silver is free. Or within the minerals area, a company mining \$22-a-ton coal will pay, under the Federal Coal Leasing Amendments Act of 1975,³⁹ a 12½ percent royalty to the U.S. Treasury on the market value of its production while another company, perhaps only

10 miles away, does not pay a cent for the \$42-a-pound uranium it is mining.

The federal government does not know the value or amount of hard rock minerals produced from the public domain. (Figures are available for hard rock mineral production from acquired federal lands because they are under a leasing system.) But if that production is estimated, conservatively, at \$3 billion per year and if a royalty equivalent to that charged for nonfuel

minerals on acquired federal lands is assumed, then the U.S. government would collect about \$120 million annually from hard rock mining on the public domain.

Nor does the 1872 Law provide any economic incentives for efficient allocation of the surface resources—land, water, timber—because they are free to the miner. In his economic analysis of the 1872 Mining Law, MacDonnell noted that

the primary weakness of the 1872 Law with respect to land use is its failure to exact a charge which at least covers the opportunity costs forgone. The loss in this regard ranges from almost nothing in the case where the land is so remote and desolate as to have little alternative value, to great, where, for example, the land has substantial value for timber, has unique scenic and aesthetic values, or contains a

known valuable mineral deposit perhaps located through government exploration work.⁴⁰

He recommends that where mining activity results in the loss of some measurable surface value, the miner should fully compensate the U.S. Treasury. Mineral deposits discovered on public lands by the federal government (usually the U.S. Geological Survey) should be offered for development on a competitive basis and royalties should be paid on their production.

In the Federal Land Policy and Management Act of 1976, the Congress declared it to be the policy of the United States that "the United States receive fair market value of the use of the public lands and their resources unless otherwise provided for by statute. . ." ⁴¹

ENVIRONMENTAL DAMAGE

In 200 years of prospecting and mineral development within the U.S., about 4 million of the 2,271 million total acres have been affected by mining, and most of this surface disturbance is east of the Rockies. This amounts to a far smaller area than is presently designated in either the National Park system or in state parks. . . [I]n all fairness modern well planned and operated mines are not the despoilers many believe them to be.⁴²

—U.S. FOREST SERVICE,
1975

The figure often cited by the mining industry that only two-tenths of one percent of the land in the United States has been affected by mining is highly misleading. This is just the surface area actually dug or stripped by miners. It does not take into account the land used for tailings ponds and piles or for ore processing. Nor does it include the thousands of miles of roads built by miners or the diggings and drill sites of prospectors—the most conspicuous man-made scars on millions of acres of western landscape. Nor are the rivers, streams, and aquifers which have been affected by mining considered.⁴³

—JOHN MCCOMB
Southwest Representative,
Sierra Club, 1977

*Pertinent data for rehabilitating mined land in ways that will promote wildlife, aesthetics, erosion control, and water quality are virtually nonexistent.*⁴⁴*

—NATIONAL ACADEMY OF SCIENCES,
1974

* This statement refers to coal mining in the West, but it applies equally to hard rock mining.

*It is not right that a prospector can drive a bulldozer onto the public land, dig a bunch of damn holes, and then just leave them.*⁴⁵

—HENRY BEAUCHAMP
BLM Environmental Coordinator,
Winnemucca, Nevada District,
1977

As manager of the public's land, the federal government has responded in a belated and superficial way to the problem of environmental damage caused by hard rock exploration and mining. It has made no systematic assessment of the environmental impact of mining under the 1872 Law; hence, there is a paucity of quantitative data on the long-term environmental costs of mining and exploration.

It is known, however, that mining activities have destroyed vegetation (grasses, shrubs, and trees), caused soil erosion, polluted streams with chemical toxins and possibly carcinogens (for example, radium), and disrupted groundwater aquifers—interrupting flow patterns and traditional sources of water supply. In addition, mining has created high noise levels in otherwise natural areas, disrupted wildlife habitats, including those of game as well as endangered species—antelope and black-footed ferrets, to name only two—and has left the landscape of some areas scarred with unsightly holes and piles of waste rock and, in the case of open pit mining—huge craters.

To date, the federal government's most noteworthy response to this problem has been to withdraw certain areas of the public domain from mineral exploration and development, in effect, to declare them off limits to all prospectors and miners.

This approach has engendered considerable controversy and confusion. In 1975 the industry publication *Mining Congress Journal* published "Is Our Account Overdrawn?" by Gary Bennethum, a mineral economist with the Department of the Interior, and L. Courtland Lee, a geologist with the Department of the Interior. They contended that two-thirds (67 percent) of all public lands were now effectively withdrawn from hard rock mineral development. Bennethum and Lee argued:

One of the major reasons this situation has occurred is the lack of any mechanism for assessing the cumulative impact of thousands of discrete withdrawals. . . . Since there is now more public land withdrawn from mineral development than is open we must create a middle ground where the mineral industry will have to accept reasonable conditions on

*its activities, while the preservationists and others will have to accept the fact that somewhere in that million acre wilderness area, there is a mine.*⁴⁶

The Department of the Interior has voiced similar concerns and in 1976 established a task force on the withdrawal issue.⁴⁷ Among the things the task force is supposed to do is to "determine which lands . . . have been withdrawn, segregated, or otherwise restricted from mineral exploration and development." The fact that the Department of the Interior, which holds the prime responsibility for managing the public domain, has to establish a task force to determine which lands have been withdrawn is instructive.

According to a more careful analysis done by the Office of Technology Assessment (OTA) in 1976, only 13.1 percent of the public domain is totally withdrawn from mineral development. The major difference with Bennethum and Lee appears to be that OTA excluded from its withdrawal figures the temporary but massive land withdrawals in Alaska under the terms of the Alaska Native Claims Act.⁴⁸

Interestingly, OTA's figures indicate that over half of the area closed to hard rock development is for nonenvironmental purposes, e.g., military, energy research and development, and so on. Of the withdrawals for environmental reasons, the most prominent are National Parks, recreation areas, and Historic Sites, which constitute 1.9 percent of the public domain, and wildlife protection areas—3.3 percent of the public domain.⁴⁹

The Wilderness Act of 1964 sets aside certain wild areas of the public lands so that they can be preserved in their natural state and not altered by human activities. But mining is the major exception. These areas are to remain open to mining and exploration through the end of 1983, although the Forest Service does regulate access. In particular, the Forest Service must approve the building of roads in these areas. And it should be noted that before an area can be designated a Wilderness it must be surveyed by the U.S. Geological Survey to determine its mineral potential. In at least one recorded case, the Wilson Mountain Primitive Area, the Geological Survey discovered a mineral deposit (copper), and upon the release of its report a private

mining company promptly staked a claim.⁵⁰

OTA and Bennethum and Lee do agree on one point—the present hard rock mining policy on the public domain is “an all or nothing system.” No distinctions are made among the different kinds and sizes of mining operations; most areas are either open or closed.

Incredibly, the federal government made no systematic effort to minimize adverse environmental impacts of hard rock mining upon the public domain which is open to prospectors and miners until September 1, 1974, when Forest Service regulations went into effect.

According to the Forest Service, it drew the statutory authority to issue these regulations from the Organic Administration Act of 1897, which authorized the Secretary of Agriculture to regulate use of the National Forests for the protection and management of their surface resources. But why did the Forest Service wait 77 years to regulate mining? According to the Forest Service, it was given “added direction through the National Environmental Policy Act of 1969 to promote efforts to prevent or eliminate damage to the environment.”⁵¹ Yet another 5 years passed before environmental regulations for miners were finally issued.

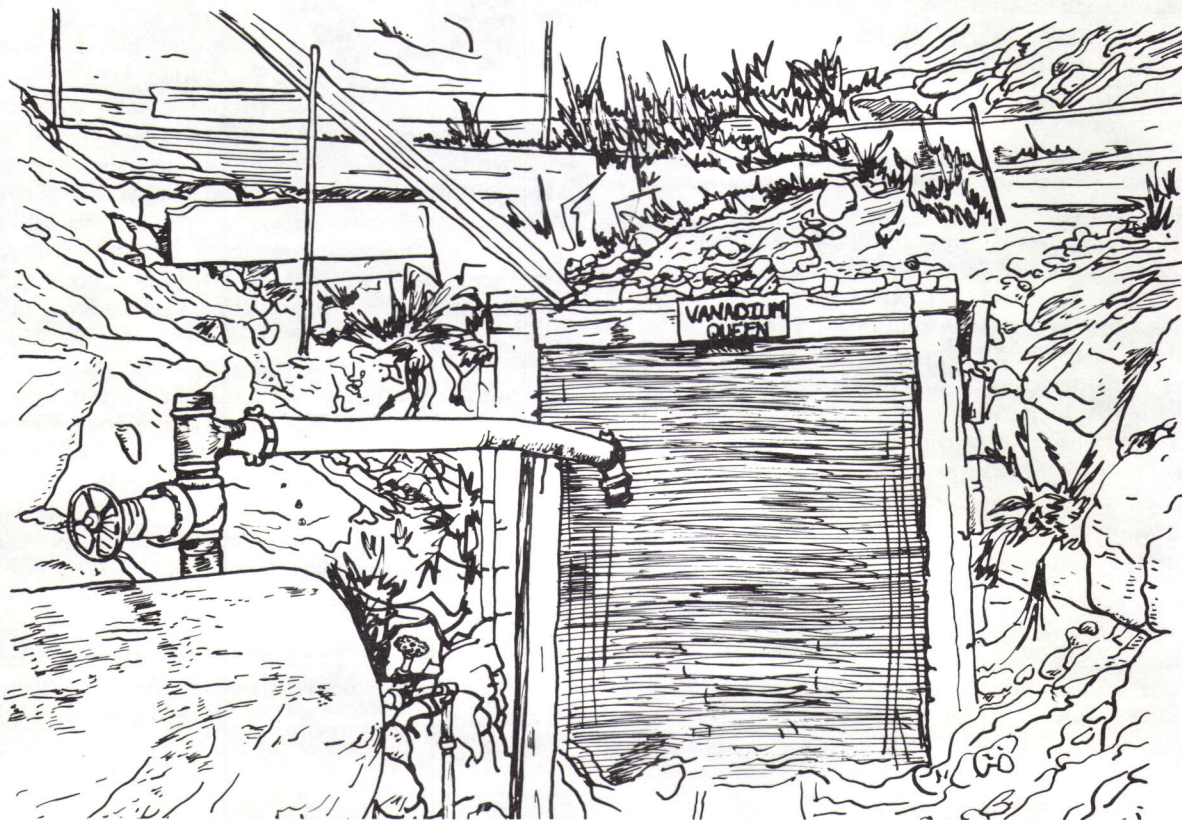
Despite the urgings of environmentalists, the Department of the Interior did not follow suit

with mining regulations for the vast majority of the lands of the public domain—those managed by the BLM. Apparently the Department of the Interior felt it lacked the statutory authority to do so. Passage of the Federal Land Policy and Management Act of 1976 left no doubt about the matter:

*In managing the public lands, the Secretary shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands. (Emphasis added.)*⁵²

BLM has published proposed regulations to implement this mandate. Until they take effect, however, hard rock exploration and mining on these lands continue as usual. (As of this writing, the Department of the Interior has delayed making a final decision on the regulations.) The instances of “unnecessary or undue degradation of the lands” are many. Two such instances are described here for illustrative purposes.⁵³

The Vanadium Queen —This is an underground mine in southeastern Utah in the La Sal Mountains, near Moab. A small quantity of vanadium is being mined from it at present, and it is being readied for increased production. The waste from this mine is dumped on a very steep slope so that it spills down all the way to the valley floor. The mining area is littered with



abandoned and rusting hulks of old mining equipment. Water is being drained directly from within the mine into a flowing stream beneath it. There is no apparent effort being undertaken to abate or monitor the mine water runoff which eventually will reach the Colorado River, although it might contain toxic and carcinogenic chemicals and appears to be of considerable volume. No effort is being made to halt soil erosion or the slide of waste rock below the mine. Vegetation beneath and around the mine has been destroyed—juniper, piñon, ponderosa. In short, this mine is an eyesore, it may be causing severe pollution problems, and it has already affected much more area than is actually mined.

The Moonlite Mine —This is an old mining area (uranium, copper, perlite, gold, and mercury) in northern Nevada in the Montana Mountains. Anaconda is currently exploring for uranium in the upper reaches of a canyon here. The Anaconda operation has crisscrossed the canyon with roads; drill pads have been built right in the middle of an active stream bed. The stream itself has been dammed and rechanneled. Vegetation (mostly shrub) has been removed from several hundred feet around the stream. Waste material from the drilling, it appears, is being dumped at random around the site. The drilling operations' effects on the surface water and the abundant ground water (only about 10 feet beneath the surface) are not being monitored even though it might be introducing toxic or carcinogenic pollutants into these waters. The drilling operation's impacts on the wildlife of the area have not been evaluated. Several uncommon species are thought to inhabit this mountain range, including mountain lions and Rocky Mountain bighorn sheep and peregrine falcons and golden eagles. BLM at present is powerless

to do anything about this operation, which is on mining claims located under the Mining Law of 1872, because its environmental regulations for miners are not in effect. The closest BLM office learned of the Anaconda drilling in this canyon from a Nevada fish and game agent who reported it to BLM because he was concerned about the amount of damage he had observed.

Before evaluating the effectiveness of the Forest Service regulations, a brief introduction is in order.

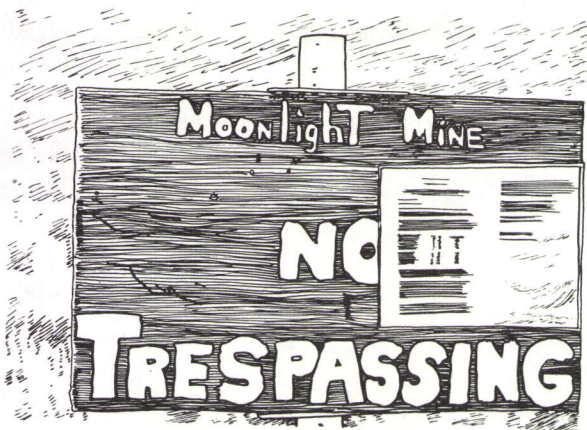
The regulations seek to keep the administrator closest to the mining activity—the District Ranger—informed about what is going on in his area and to allow the Forest Service to work with the miners to minimize their environmental damage as well as to assure that some reclamation of exploration and mining sites is accomplished.

The Forest Service requires that a miner file a notice of intent for any operation "which might cause surface resource disturbance." A written plan of operations is required from "all operators who will likely cause significant disturbance" or who will use explosives in surface operations. And "almost without exception, road and trail construction and tree-clearing" are considered to be a "significant disturbance." In some cases the operator is required to post a bond to cover the cost of reclamation.⁵⁴ According to the Forest Service,

*[b]onds required should not be excessive but should be sufficient to cover the cost of reclamation identified and agreed upon in the notice of intention to operate or operating plans. Along with other factors, the economics of the operation should be considered in determining what are reasonable environmental protection requirements.*⁵⁵

The District Ranger is required to do an environmental analysis report (EAR) on each plan of operations before approving it. The EAR should not be confused with an environmental impact statement (EIS). In practice, it is usually briefer, more informal—not an exhaustive interdisciplinary analysis. Under the Forest Service mining regulations, the District Ranger determines whether an operating plan requires an EIS. If so, it will be done by the Forest Service.

The Forest Service has approved about 1,300 operating plans and has received about three times that many notices of intent. The Forest Service does not know the number and amounts of reclamation bonds which have been required. In only four cases have EIS's been (or are being) prepared:





A drill pad at the Moonlight Mine in what was an active streambed, one of the few permanent streams in this arid area.

- A Homestake Mining Company proposal to mine a uranium deposit on the Gunnison National Forest, Colorado—the pit would be 4,000 feet long, 400 feet wide, and about 700 feet deep and a mill would process about 600 tons per day.
- A Rocky Mountain Energy Company proposal to mine six uranium ore bodies over a 10-year period in the Thunder Basin National Grassland, Wyoming—it would also include a mill to process 1,000 tons of ore per day.
- An Asarco, Inc., proposal to mine (underground) and mill a copper-silver deposit on Kootenai National Forest, Montana—the mining rate would be about 3 million tons per year, and the reserves indicate the operation will last 19 years.
- A Bren-Mac Mines, Ltd., proposal to mine (underground) and to mill a copper-molybdenum deposit on the Mt. Baker-Snoqualmie National Forest, Washington.⁵⁶

There is no such thing, of course, as an “average” mine due to the vicissitudes of hard rock ore deposits. However, an idea of the kind of mining operation for which the Forest Service is *not* requiring an EIS is possible from some facts about a medium to small mine and processing operation on public land.

The Barite Mine —It is located in central Nevada on the Toiyabe National Forest, Austin District, in the foothills of the Toiyabe Range. This deposit of barite was first found by the U.S. Geological Survey. (Barite, an unusually heavy material used in well drilling, controls well pressure in oil and gas drilling.) In 1967, All Minerals, Inc., a small Salt Lake City-based company, staked claims to the deposit. Mining operations started in 1972. The mine now employs about 40 persons and produces about 150,000 tons of barite per year. The deposit, an unusually rich one, lies beneath a ridge, buried by about 70 feet of overburden. All Minerals would eventually like to mine this whole deposit,



A barite surface mining operation on the Toiyabe National Forest, Austin, Nevada.

gouging out a swath about 1,000 feet wide and about 8 miles long (1 mile is already mined), producing perhaps 500,000 to 600,000 tons of barite.

In the process of removing the overburden to get at the ore, the vegetation—mostly piñon trees, mountain mahogany, sage, and several species of herb and grass—are removed, and large piles of waste materials are created. The wildlife of this particular area is considered “fairly sparse” by District Ranger Clair Baldwin—mostly chukar partridges, lizards, rattlesnakes, and coyotes. No endangered species have been spotted here. The mine does not appear to be interfering with any surface or ground water systems. The operation also includes a rock crusher and a separator, for which water is piped in from BLM lands and a local rancher. There is also a tailings pond. Overall, this operation (including roads) affects about 600 acres of land.

The Forest Service has required the posting of a \$10,000 reclamation bond, and All Minerals is beginning reclamation efforts while mining is still going on. These efforts are concentrated on grading the slopes of the overburden piles so they will not be too steep for stabilization and on revegetating them with brush and grass. A major concern in this regard is the lack of precipitation, perhaps only about 6 to 7 inches per year. The District Ranger refers to this as “a cold desert ecological system” and is not sure which species of plants will come back after mining. There do not appear to be any conflicts

with other users of the public lands. In this instance, one wild and remote ridge, which has a desolate but not unique kind of beauty, is being sacrificed to meet society's need for barite.

The Forest Service does not know how many notices of noncompliance have been issued by its officers under the mining regulations. These could be issued for failure to file a notice of intent or a plan of operation or for failing to adhere to an approved plan of operation.⁵⁷ In practice, the Forest Service tries to avoid having to issue notices of noncompliance and does so only in the most intransigent of cases.⁵⁸ For example, in southeastern Utah on the Manti-La Sal National Forest, Moab District, a prospector for uranium—Union Carbide—bulldozed an area of about half an acre (juniper and piñon vegetation for the most part) and sank several drill holes without ever filing a notice of intent.⁵⁹ A Forest Ranger came upon the site after the drilling had been completed. After tracking down the operator, the Ranger had him return to the site and attempt to undo at least some of the damage, contouring, removing debris, and building water bars. No notice of noncompliance was ever issued, and the regulations do not allow for the levying of a fine in such cases.

There have been only three instances of the Forest Service taking mining operators to court. In all three cases, the courts restrained further operations until the defendants complied with the regulations.⁶⁰

There have been no legal challenges of the



The vertical mining face of the Barite Mine is being moved back several miles, eliminating the forested ridge.

regulations, but environmentalists have objected to the Forest Service approval of operating plans in three cases. In two of them, the plaintiffs lost in lower court but are appealing. In the other, *Sierra Club and New Mexico Central Clearing House v. Secretary of Agriculture*, the case was dismissed on the basis of the Forest Service's undertaking an administrative review of its decision to allow Bokum Resources Corp. to operate in the roadless Mt. Taylor area on the Cibola National Forest—the first such case to go through this review process.⁶¹

By its own admission, the Forest Service has moved very cautiously in enforcing these regulations and has gone to considerable lengths to avoid litigation. Generally the Forest Service has won high praise from the mining industry for its handling of the regulations. One District Ranger noted: "Ours has not been a hardnosed approach. We've walked softly and in most cases the miners have been cooperative."⁶²

Interviews with Forest Service personnel in the field in Utah, Nevada, and Arizona concern-

ing the mining regulations indicate a consensus on a number of points:

- The compliance rate among prospectors and miners operating on the National Forests is about 75 to 95 percent. (This estimate is impossible to verify due to the vast areas involved.)
- Considerable uncertainty and concern exist in regard to the Forest Service's ultimate legal authority over the miner. As one District Ranger noted, "When I am sitting down with a mining company and proposing changes in their operating plan or suggesting a \$10,000 reclamation bond, there is, in the back of my mind, the worry—What do I do if they tell me to go to hell."⁶³ In a speech to the American Mining Congress, John R. McGuire, Chief of the Forest Service, said: "The 1872 Mining Law does not permit us to refuse prospecting and mining . . . for environmental reasons."⁶⁴

- Enforcement of the mining regulations has stretched Forest Service personnel very thin, especially at the District level in areas of increased exploration activity in Idaho, Montana, Nevada, Utah, Wyoming, and California; for example, on the Toiyabe National Forest, Nevada, Austin District, one District Ranger is responsible for overseeing 1.4 million acres of land. Clearly, under such circumstances, he cannot keep track of the comings and goings of every prospector or miner on the public domain, and indeed he must spend an inordinate amount of time tracking down operators who did some work—perhaps bulldozed a road or dug a 6-by 20-foot trench while exploring for silver or gold but never filed a notice of intent.

And because the regulations are designed to deal with a specific operator at a specific site, there is worry that the cumulative effects of many operators exploring or mining in a given area do not get considered. EIS's might well be appropriate in such cases, but this has yet to happen and the Forest Service is reluctant to undertake the effort and time and expense involved.⁶⁵

An assessment of the Forest Service's regulations, based on a limited sample, indicates certain shortcomings, both structural and procedural.⁶⁶

First of all, there seems to be a fundamental flaw in the Forest Service's methodology—a lack of baseline data. The National Academy of Sciences has stated that for improvement of rehabilitation techniques and reduction of the environmental impacts of mining, "there must be a complete baseline inventory of the existing ecology, geology, and hydrology" *before* operations commence.⁶⁷ A very limited sampling of the EAR's done by District Rangers suggests that adequate baseline data were not available; this seemed particularly true for hydrological baseline data as well as wildlife data, especially on endangered or threatened species. Apparently they simply have not been inventoried.

Further, there are apparently not adequate plans for monitoring the water disruption and pollution caused by mining and exploration activities, especially the pollution and disruption of ground water systems. In the case of uranium mining and exploration, for example, there are no apparent plans for monitoring surface or ground water for radium-226, a known carcinogen.

Lastly, the Forest Service did not seem to possess any data concerning air or noise pollution

from hard rock mining and milling operations and evidenced little interest in potential problems in this regard.

On the positive side, the Forest Service seems to be accumulating an impressive body of data on reclamation techniques through its research program, Surface Environment and Mining (SEAM). Additionally, Forest Service personnel in the field are gaining valuable practical experience in reclamation work. In both instances, the emphasis appears to be almost exclusively on revegetation and prevention of soil erosion; the hydrological consequences of mining have been given far less attention.

There is a disagreement within the Forest Service as to whether an operator should have to prove that he has discovered "a valuable mineral deposit" or to show from the available geological data that one might exist before his operating plan is approved.⁶⁸ As noted earlier, the ultimate test of a mining claim's validity is whether "a valuable mineral deposit" exists or not.

Although the proposed BLM regulations are structured along the lines of the Forest Service's, they have aroused noticeably more opposition among miners and prospectors, large and small, but especially the small. Groups such as the Western Association of Land Users are organizing opposition to the proposed regulations.⁶⁹ Certainly some of this can be attributed to the fact that far vaster areas of land are affected. Also, however, BLM's proposed regulations do require more specific information in the notices of intent and plans of operation and appear to have more stringent bonding requirements. On the other hand, there seems to be a plenitude of misinformation among opponents about the content of the proposed regulations and the intent of the Congress in the Federal Land Policy and Management Act.⁷⁰

However this conflict is ultimately resolved, BLM will have its hands full enforcing mining regulations. The BLM District Office in Winnemucca, Nevada, which is not unique, has 8 million acres of land to supervise, and it will be the primary task of one environmental coordinator and two geologists to see that the regulations are being complied with. And this is an active mineral exploration area—gold, silver, copper, uranium, and mercury; miners there are used to going where they want on the public domain, doing pretty much what they want, and not telling anybody about it.⁷¹

MULTIPLE USE

The term "multiple use" means . . . the harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the combination of uses that will give the greatest economic return or the greatest unit output.

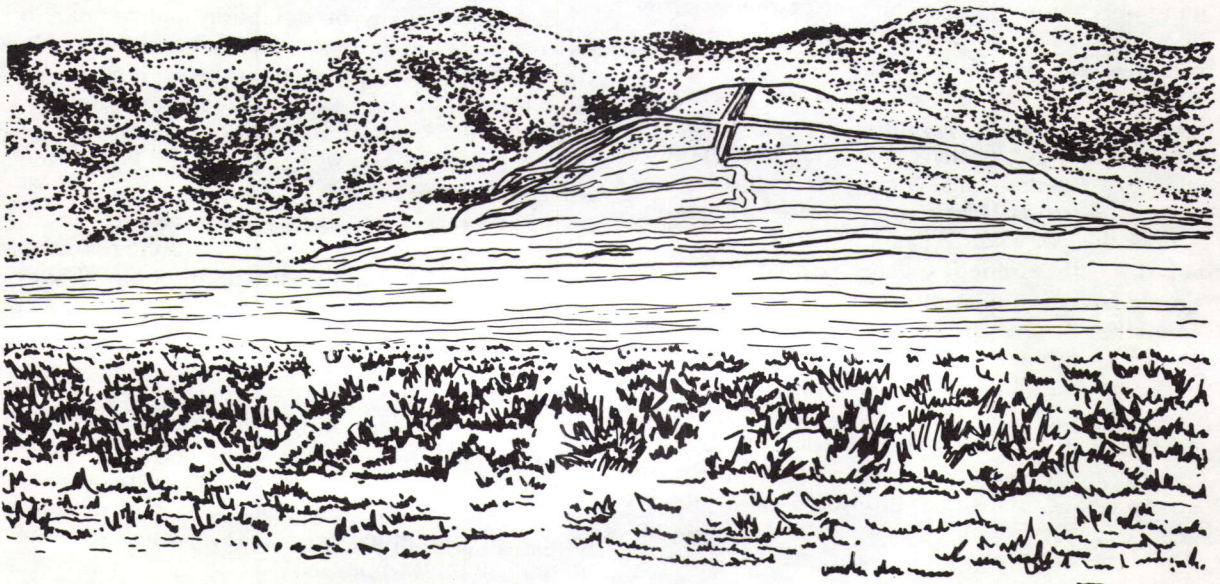
—THE FEDERAL LAND
POLICY AND MANAGEMENT ACT,
1976⁷²

In the Multiple Use-Sustained Yield Act of 1960, the Congress spelled out five chief uses for the National Forests—outdoor recreation, fish and wildlife, timber, watershed, and range. Others, of course, include mining and wilderness. In the Federal Land Policy and Management Act of 1976, the Congress officially extended the multiple use policy to the nearly 1/2 billion acres of land under BLM management.

The underlying principle of multiple use is that the public's land should be managed in such a manner that a balance is struck among these various uses and they are made as compatible as possible. Nonetheless, conflicts inevitably arise. For example, the land occupied by an open pit copper mine, which may measure 3 miles from rim to rim, is no longer usable for other purposes such as grazing or hunting. These uses, in effect,

are sacrificed to meet society's need for copper. It is the responsibility of the land management agency to minimize the effects of such a conflict. In the short run, certain measures can be taken; for instance, the mining company can be required to fence in the entire area it is mining, in order to protect animal life and humans, and to fertilize and seed its tailings dumps. Over the long run, minimizing such conflicts is a prime purpose of the land use planning done by the management agency. Through planning, it might be determined, for example, that the nonmineral uses of a certain area were simply too valuable to allow open pit mining, but perhaps underground mining might be permissible.

There is no question that mineral exploration and development conflict with other uses of the land. The magnitude of those conflicts, however,



A surface gypsum mine east of Carson City, Nevada, on former BLM land that was patented.

can vary tremendously, depending on the characteristics of the area affected and the type of mining employed. For example, about 40 miles east of Carson City, Nevada, an apparently large surface deposit of iron ore has been discovered and claimed on BLM land. It is a dry area of low hills and shrub vegetation. Other uses of the land appear to be limited to very light grazing and a few common species of wildlife. In the general vicinity are pumice and gypsum mining and processing operations. Eventually, this particular site will be an open pit iron mine, and so long as our society needs iron, it seems an ideal spot for it.⁷³

However, if the deposit were in a high mountain valley beneath meadow grasses and a 200-year-old stand of Ponderosa pine, at the headwaters of two yearround streams, and if the valley were a favorite spot at different times for trout fishermen, elk hunters, birdwatchers, and campers, then the relative desirability of the open pit iron mine becomes an entirely different matter.

Serious conflicts are involved with other uses, and the management agency must make a careful evaluation of the long-term costs to society of mining there. In similar cases, the mining industry has argued that the ore must be mined because over the 20-year life of the mine, say, \$200 million worth of iron ore will be produced. And surely the nonmineral value of the land does not even approximate \$200 million. The trouble with this very familiar kind of accounting is that it is woefully myopic. It fails to take into account the total value to society of that valley's nonmineral resources over many generations—long after the iron has been consumed but the damage from mining it still remains. In addition, it is extremely difficult to assign a dollar figure to certain values, such as the primal pleasures of catching a trout or drinking freshwater.

These are obviously extreme cases used for illustrative purposes; most mining operations no doubt fall somewhere in the grey areas between.

Chapter V Special Issues

THE SMALL MINER

The major mining companies, as well as other mining interests, are not yet ready to concede that the small miner does not play an important role in the development of mineral resources in America.⁷⁴

—HOWARD L. EDWARDS
The Anaconda Company,
1969

I'd hate to see the little guy driven out of the business of going out and looking for a mineral deposit and staking a claim.⁷⁵

—DAHL ZOHNER
District Ranger,
Manti-La Sal National Forest,
Moab, Utah, 1977

The "small miner" is inevitably evoked in any discussion of regulating hard rock mineral development on the public domain. Unfortunately the small miner is a phenomenon which is poorly understood. Estimates as to the number of small miners working the public lands vary widely, even on a local or regional basis. In the same Forest Service district, one Ranger estimated there were about 40 to 50 small miners operating in the district while another estimated there were 400. This is not unusual. Multiply that kind of discrepancy many times to take in the whole West, and you get some idea why no reliable figures exist on the number of small miners.

Part of the problem is that the definitions of a "small miner" are so broad as to be amorphous. Is an individual employed full time in some other occupation who prospects for minerals on weekends with a pickup truck and shovel a "small miner"? Some say so. Is the owner of a mine which produces 100,000 tons of ore per year and represents a capital investment of \$700,000 a "small miner"? Yes, according to other definitions. Within the mining industry itself, there is little agreement over what constitutes a "small miner."

As for the small miner's economic role, it is generally conceded that he is not a significant factor in the actual production of minerals (except perhaps the precious metals and gems such as turquoise) because mineral production today requires such a large capital investment that the small miner cannot afford it. There the agreement ends. There are many in the federal government and the industry who argue that the small miner plays a vital part in the finding and developing of minerals before production. In the words of Koehler Stout, President of the Montana Mining Congress, they are the "bird dogs" of the industry.⁷⁶ Others contend that this was certainly the case in the 19th century when small prospectors found many major ore deposits but not today when "most of the valuable surface exposed minerals have probably already been discovered," and it is the "concealed deposits" which "remain to be explored and utilized."⁷⁷ These require exploration techniques too sophisticated and costly for the small miner—diamond drilling, airborne magnetic surveys, and chemical assays of aquifers, to name a few.

Resource economists like Orris C. Herfindahl and John Schanz tend to downplay the economic importance of the small miner, whom they de-

scribe as "marginal."⁷⁸ The trouble with such terms as "marginal" is that they tend to obscure the fact that there are real flesh-and-blood human beings out there. In towns such as Moab, Utah; Austin, Nevada; and Globe, Arizona; and others like them throughout the western United States, there are a good number of people who are full- or part-time "small miners." And if they cannot afford the additional costs involved in complying with new mining regulations and must go out of business, they will suffer economic hardship, and so will the communities in which they live. But no data exist and there is no way of assessing the magnitude of this problem.

One Forest Service official guessed that the mining regulations have increased the operating costs of "small miners or operators" by as much as 25 percent, compared to an increase of less than 10 percent for "large operators." He added: "I am sure the regulations have driven some small operators out of business—either because of the higher costs or perhaps they got sick of all the red tape."⁷⁹

A conflicting view was voiced by John Lombardo, himself a small miner in Austin, Nevada:

*If the requirements of the Forest Service put anyone out of business, they weren't in business in the first place. The cost of compliance has been minimal. The costliest item has been the bond—and a \$10,000 bond costs only about \$100 a year.*⁸⁰

The Council on Environmental Quality commissioned Anthony Payne, Professor of Economic Geology at the University of Nevada and a practicing geologist, to evaluate mineral development and exploration in Nevada in order to determine the role of individuals—amateur prospectors as well as professional explorationists (those using scientifically based geological, geochemical, or geophysical techniques)—and of different size corporations.⁸¹ Federally owned lands constitute 86.6 percent of Nevada.

Payne's analysis indicates that very few old-fashioned prospectors remain in the state and their role has greatly diminished. "No important mineral discovery has been made in Nevada by an amateur prospector in the post-World War II period." By whom are mineral discoveries being made? "Most of the important ore finds in Nevada in recent years have been made by independent explorationists, by explorationists working for small-to-medium sized companies, and by geologists of the U.S. Geological Survey," Payne reported.

As for the "small miner," Payne found that the total production from their operations ac-

counted for less than 1 percent of Nevada's annual mineral production. He added:

Several hundred to a thousand or more small miners in Nevada hold mining claims in the mining districts scattered throughout the state. . . . Many of them subsist on the hope that a company representative will come along and develop their claims. . . . The exploration and development of a modern mine requires a very substantial amount of money.

Payne also found that "[t]he very large companies active in mineral exploration in Nevada have not been particularly successful." Such groups have their sights set unrealistically high, according to Payne, and they do not look for the economical but modest size ore deposits in the range of \$10 million to \$100 million gross value. Additionally,

there is a tendency for large companies to be less efficient, for example, in terms of the number of days each employee actually spends in the field doing the exploration work, than smaller groups with more narrow objectives and close direction of effort.

AMAX has surveyed major mining companies to determine how many of the mineral properties brought to their attention by "small miners" actually reach production. The definition used by AMAX of a small miner was very broad:

*A small miner is an individual, partnership or corporation which is not listed on a major stock exchange, which has capitalization of less than \$1 million, which employs fewer than 50 persons, or which produces less than 200,000 tons a year.*⁸²

The results of the AMAX survey are shown in the attached table. They clearly demonstrate that there is a steady stream of proposals flowing into the larger mining companies. The odds of an individual or small company's mining claim being purchased or leased by a large company appear to be very bad—about 2,000 to 1—and the odds are even worse that the claim will ever be produced.

Economist Robert Anderson has made an interesting suggestion. If the small miner-pro prospector (the "bird dog") really has an important economic function to perform vis-à-vis the large mining companies, then it would be within the interest of the large companies to formalize the relationship "in an employment contract (containing suitable incentives for discovery)."⁸³ Typically, large mining companies spend 3 to 5 percent of their total costs on exploration, so some increases in these expenses would seem possible.⁸⁴

MAJOR MINING COMPANIES' PROPERTY SUBMITTALS

						Individuals and Small Company Figures Only				
Year	Total	Individuals and Small Companies	Rejected	Examined	Deal Made	Drilled	Dropped	Under Consideration	Production or Planned	Disposition
1970	2,452	2,161	1,474	895	115	101	221	35	16	72
1971	2,266	1,888	1,341	800	85	82	210	47	13	44
1972	2,374	1,940	1,340	839	92	77	213	41	12	65
1973	2,550	2,020	1,346	934	106	88	244	67	12	41
1974	2,777	2,351	1,623	1,004	112	92	315	95	12	54
1975	2,992	2,591	1,801	1,116	113	91	300	153	18	70

Source: AMAX, Inc., 1977.

MINERAL SUPPLY

*So long as the bureaucracy responds only to the political opportunists rather than to the long-term needs of our people for minerals at a reasonable cost, we can expect shortages to multiply and mineral prices ultimately to increase.*⁸⁵

—DON H. SHERWOOD
Attorney, in a memo to
his mining clients on
the proposed BLM
regulations, 1977

U.S. mining interests, fortified with data from the U.S. Bureau of Mines (see attached chart), have expressed alarm over the nation's increasing reliance on foreign mineral sources, and on more than one occasion have based their opposition to "interference" in mineral exploration and production by the federal land management agencies on the premise that it will only weaken us more.

For purposes of policy analysis, the key question here is not whether concern about our future mineral supply should be a consideration in the formulation of hard rock mining policy on the public domain. That is already a given. But is it a sufficiently serious problem to make it the overriding issue? The answer is no.

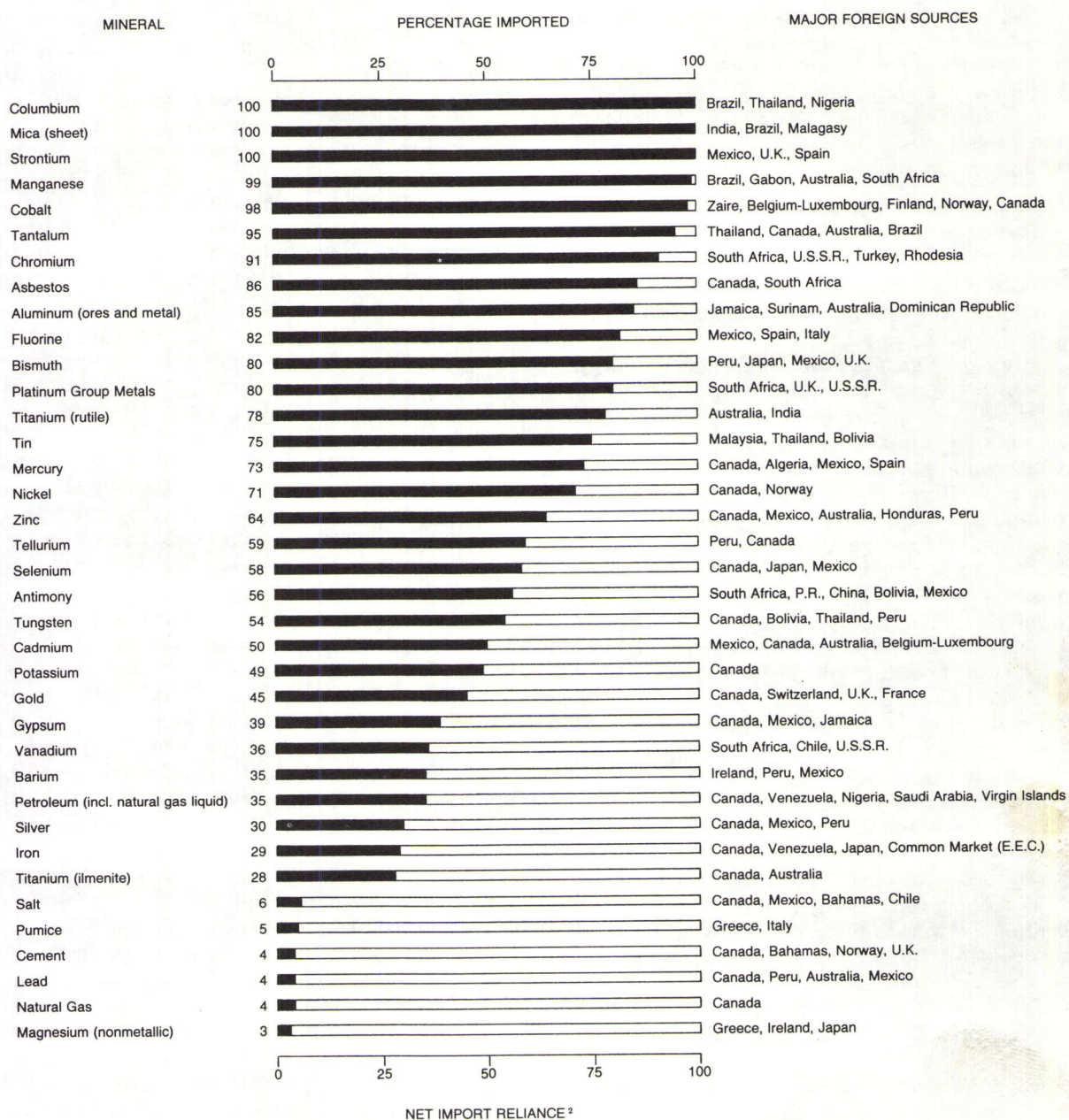
Economist John Schanz, assistant director of the Resources for the Future (RFF) Energy and Materials Division, has provided an excellent perspective on the mineral supply situation.⁸⁶ He noted that although a cursory inspection of the Bureau of Mines chart would suggest the United States imports more than half its mineral requirements, in reality domestic production of

raw minerals in 1975 was three times the value of raw mineral imports.⁸⁷

His analysis indicated there is a small group of minerals for which the United States must rely heavily upon imports, or will have to in the future, and for most of them it has almost always had to. Among these are: chromium, cobalt, manganese, phosphates, and tin. At the other extreme, there is another group of minerals for which the United States is well off now (when current production and consumption are compared), and we should remain so for some time to come. Among these are: lime, magnesium, molybdenum, nitrogen, and sulphur. In between, there are over 50 mineral commodities in which there have been improvements as well as declines in our ability to supply ourselves. Schantz concluded:

Measured in dollars, the United States became a net importer of minerals in the late twenties. By 1950, we were a net importer of approximately 8 percent of our needs. This reached 15 percent in 1970. Except

IMPORTS AS A PERCENTAGE OF TOTAL U.S. CONSUMPTION¹ IN 1975



¹Apparent consumption = U.S. primary + secondary production + net import reliance

²Net import reliance = imports - exports + government stockpile releases ± industry stock changes

Source: U.S. Bureau of Mines (import-export data from Bureau of the Census).

*for the recent acceleration to approximately 25 percent due to petroleum, our national shift toward mineral importation can be characterized as a gradual process. Perhaps this trend could be halted but it is unrealistic to expect that it could be reversed. Nor is it really necessary for the U.S. ever again to be totally self-sufficient. Past history suggests that for minerals in general our evolutionary shift toward importation need not be viewed as something requiring hurried or drastic corrective action.*⁸⁸

Many economists argue that so long as the nation possesses a strategic reserve of key materials, it is not relevant to match imports and exports of similar commodities in looking at a trade surplus or deficit. What matters is the overall balance of payments.⁸⁹

After the Organization of Petroleum Exporting Countries (OPEC) demonstrated that it could exercise cartel power over oil prices and supply, it was only natural that speculation would arise concerning nonfuel minerals as well.⁹⁰ Fortunately for the United States, however, the formation of cartels in other mineral markets seems most unlikely for the foreseeable future. It would be a mistake to lump nonfuel minerals together with oil. The preconditions for cartel formation in nonfuel minerals do not exist, except possibly in one case. In almost no other mineral commodity do you find the high concentration of control of reserves in the hands of very few as you do in oil with the countries touching the Persian Gulf.⁹¹ In addition, with nonfuel minerals, the possibilities of recycling, substitution, and stockpiling are much greater. This makes for more elasticity of demand than in oil. The major exception to this rule is bauxite; three leading producers (Australia, Jamaica, Surinam) in the International Bauxite Association control 65 percent of the world's reserves, and even during the recession year of 1975, bauxite prices continued to rise, reflecting the growing power of these producers—especially Jamaica. The United States imports over 85 percent of its bauxite consumption.⁹²

Copper and tin have also been cited as potential commodities for cartel control. In copper, the three leading producers (Chile, Zaire, Zam-

bia) in the Conseil Intergouvernemental des Pays Exportateurs de Cuivre (CIPEC) control 35 percent of the world reserves. The United States imported about 20 percent of its copper consumption in 1974 and 1 percent in the recession year of 1975. Due to the wide distribution of copper resources throughout the world, the desire of several copper producing nations to increase their share of the market, and the ability of consumers to substitute other metals, including aluminum, for copper, it is unlikely CIPEC will be able to become another OPEC. As for tin, three countries (Malaysia, Bolivia, Indonesia) control 60 percent of the world's reserves. The United States imports about 75 percent of its tin consumption. However, the International Tin Council, an organization of producers and consumers, has only been able to maintain a price floor for tin by export controls on producing nations.⁹³

Calculations based on the historical experience for tin, aluminum, and copper suggest that any price increase is more than offset by the long-run drop in demand, so that the total return to the producers eventually becomes less than before the price change.⁹⁴

Obviously any attempt to predict future mineral commodity prices is fraught with uncertainty. As the higher grade ores are depleted and less economic lower grades are developed, there certainly is a tendency for prices to increase. In addition, various governmental controls over exploration, mining, and, particularly, processing will increase prices somewhat. For example, an Arthur D. Little analysis of the economic impact of air pollution controls on copper smelters suggests that they could increase copper prices about 10 percent by 1985 over what they would have been without controls.⁹⁵

The more dire predictions by some industry officials of precipitous increases in mineral commodity prices, however, are not supported by most resource economists. For example, John Schanz said: "Our [RFF's] current expectation is that minerals will be a relative bargain—that is, their prices will increase less in the coming years than other goods and services."⁹⁶

Chapter VI

Key Objectives

The key objectives of a hard rock mining policy may be framed as strategic questions against which any mineral system for the public's land can be measured:

- Does the system provide for multiple use of the public lands and integration of mining into land use plans being developed for the public lands?
- Does the system provide adequate incentives for the continued exploration and production of minerals?
- Does it provide adequate environmental safeguards?
- Does the public retain ownership of the land?
- Does the public receive a fair market return for the use of its resources?
- Does it allocate scarce resources efficiently?
- Does it encourage energy conservation?
- Does it promote competition within the mineral industry?
- Does it provide the federal government with adequate information for rational decision-making?

Clearly, the present claim-patent system provides adequate incentives. Whether it promotes competition is debatable. But none of the seven remaining objectives is met under the present system.

MULTIPLE USE

As already noted, the Congress has mandated, through the Multiple Use-Sustained Yield Act of 1960 and the Federal Land Policy and Management Act of 1976, that the public lands be put to multiple use. The Mining Law of 1872 conflicts with this objective because it mandates a single use wherever a valuable mineral deposit is found.

The primary tool that the land management agencies employ to implement the multiple use mandate is land use planning. Through this process the resources of the land are determined, and plans are laid to manage the resources in a

way which is consistent with their uses—recreation, wildlife, range, timber, watershed, and so on. Although hard rock mineral development is one of the chief uses of public resources, it is not really part of the land use planning process because under the Law it must always usurp the other uses unless the land is withdrawn from mineral development. Hence, the extensive land use planning now being undertaken by the Forest Service and BLM is not truly comprehensive and will not be unless the 1872 Law is changed. Until that time public land use decisions cannot be made on the basis that hard rock minerals development is one among several important uses of the land. Ultimately, under a full-fledged multiple use decisionmaking process, dealing with the question whether or not to mine a given piece of the public's land should be essentially no different than whether or not to graze, or to cut. In all such cases, the question to be asked is: What is the relative value (quantitative or qualitative) of the other uses which are to be sacrificed versus the value of the resource which will be developed? It is not an easy question, but it lies at the very heart of the land use decisionmaking process, and comprehensive land use planning should provide a rational context in which to seek an answer.

INCENTIVES

Whatever system is agreed upon must provide the economic incentive to look for and develop minerals. As Schanz noted, minerals are one of the basic building blocks of our economy.⁹⁷ And the public's land is an important source of minerals. In this context, it is well to keep in mind that

*[i]n recent years the cost in time and money of exploring for ore and developing reserves has increased markedly; at the same time, the rate of discovery has decreased markedly.*⁹⁸

—U.S. GEOLOGICAL SURVEY,
1975

Payne's study corroborated this view:

*The pattern of discovery and development of new ore deposits in Nevada during the period 1950-1972 reveals that ore is being mined much more rapidly than it is being found. . . Exploration in the surrounding states of Utah, Idaho, Oregon, California, and Arizona has, on the whole, been even less successful than Nevada in finding new ore to replace the reserves mined in recent years.*⁹⁹

Given the right price, people will explore for minerals (witness the recent upsurge of uranium exploration which accompanied the dramatic increase in the price since 1974), if they are allowed to profit from their investment.

If a leasing system, for example, required competitive bidding on all known mineral deposits regardless of who discovered them, then it would discourage further exploration. The chief incentive to explore is the chance of profiting from discovery. (The current leasing program for fuel and nonfuel minerals provides this incentive.) On the other hand, if a government geologist discovers a mineral deposit—and it is an often overlooked fact that government geologists have made many major mineral discoveries in the West—then competitive bidding makes sense because no private firm has incurred exploration costs. In addition, the government could put up for competitive bid the right to explore a given area of favorable mineral potential and guarantee the company which makes the best bid the right to the ore it discovers. (This approach, for example, is used in oil leasing on the public's land.)

Further, people will mine and process ore if they can make a profit. In this regard, it should be noted that the economic life of an ore body is often more than 20 years. If a company is going to make a major capital investment in the production of that ore body, it must have some reasonable assurance of a return on investment over time. For example, AMAX will have invested about \$500 million in a new molybdenum mine at Henderson, Colorado, which, when it reaches full production in 1980, should yield 30,000 tons of ore per day.¹⁰⁰ Obviously many factors entered into AMAX's decision to make that level of an investment:

- Demand for the product is very strong (molybdenum is used to harden steel and to make it heat resistant).
- AMAX holds a dominant position in the molybdenum market.
- AMAX's tenure is secure because the ore

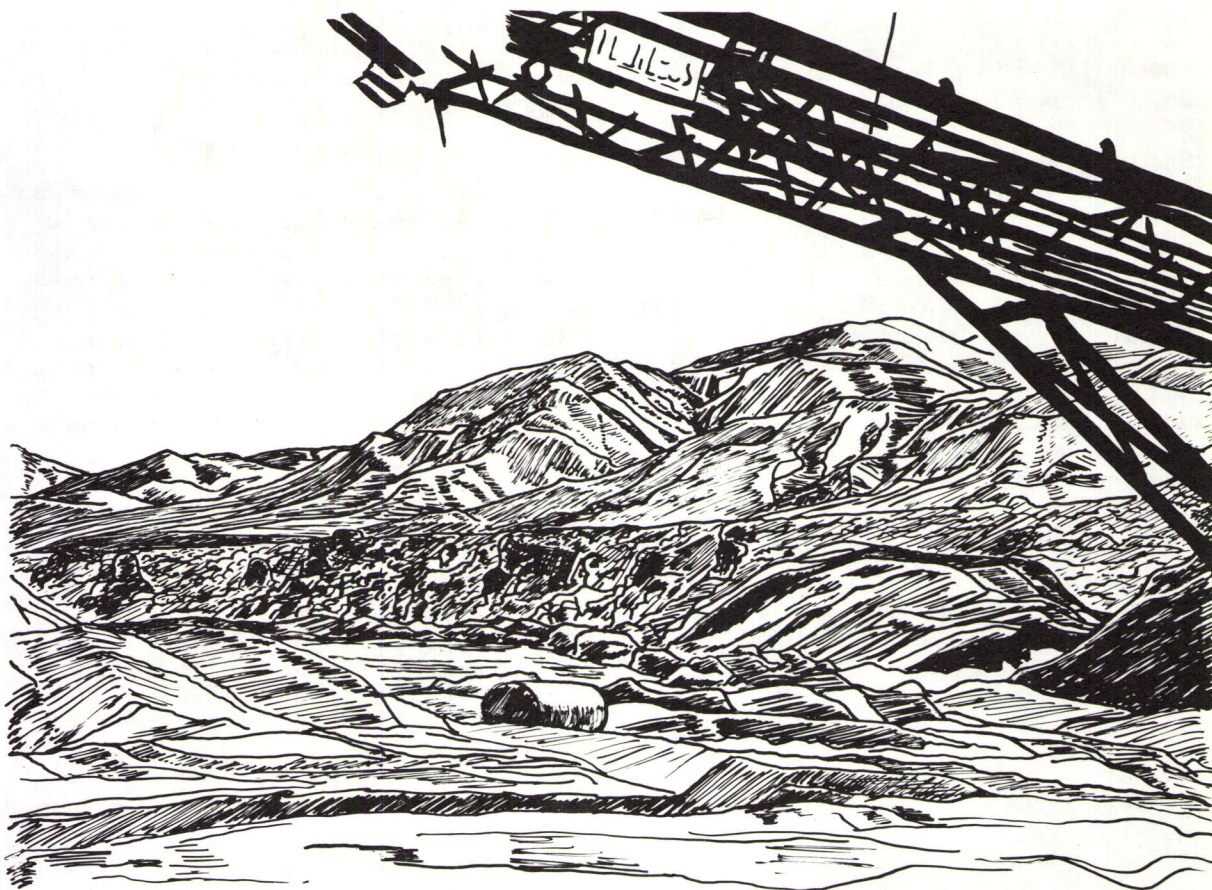
body lies beneath lands patented by AMAX (it was formerly National Forest land) or obtained in land exchanges with the Forest Service.

Security of tenure is an important consideration; however, there are other ways of achieving it than through patenting. For example, the government can guarantee the mining company's right to a particular deposit for the deposit's economic lifetime so long as agreed upon environmental standards are met. Then, after the deposit is spent, the property can revert to the public domain. It is also important that the mining company be given sufficient time to begin development of the ore deposit before forfeiting its right to that deposit. (Under federal coal leases, for instance, the leaseholder must begin development of the deposit within 10 years and produce the deposit at a rate that will complete development within 40 years.)

ENVIRONMENTAL SAFEGUARDS

As already noted, the Congress has laid down some fairly specific policy guidelines in the Federal Land Policy and Management Act of 1976. But even if the Forest Service and BLM were fully enforcing their regulations, these guidelines could not be completely implemented because of unresolved conflicts with the Mining Law of 1872. Under the current claim-patent system, adequate environmental safeguards do not exist.

The fundamental flaw is that the land management agencies do not have clear-cut legal authority to require adequate environmental protection. They can require a notice of intent, they can require an operating plan, but they cannot say no. Under the terms of the Mining Law of 1872, all lands in the public domain, unless withdrawn, are open to any citizen who is searching for hard rock minerals, and if that citizen locates a valuable mineral deposit, he has the right to develop it. This remains the main body of our hard rock mineral policy for the public domain. The new Forest Service and BLM regulations are satellites which orbit this body. For example, on Forest Service land in southeastern Utah near Price is a mountain ridge beneath which lies a high grade limestone deposit. A mining company has already staked claims to the deposit. The limestone deposit runs across the whole ridge for several miles just below the surface, and as one Forest Service geologist put it: "The limestone holds the top of the mountain together."¹⁰¹ Mine that deposit and the environmental consequences



A tailings pond surrounded by the slag left from the barite ore processing on the Toiyabe National Forest, Austin, Nevada.

would be severe and probably irreversible—erosion will cause siltation of surface waters below the mountain, and removal of the limestone will destroy the aquifer system of the area. The Forest Service can require the mining company to file a notice of intent and a plan of operations; it can seek to minimize the damage by persuading the company to make certain precautions part of its operating plan. Still, great environmental damage will be done; it is unavoidable. The Forest Service cannot say to that company, "You cannot mine that deposit" because the company, under the Law, has a right to mine its claims.

On a somewhat less dramatic level, the Forest Service regulations are notably silent on what to do if a mining company refuses to accept modifications in its plan of operations which are proposed by the Forest Service and goes ahead with its exploration or mining as planned. Can the Forest Service compel a mining company to change its plan of operations? In the absence of any specific court decisions on this issue, the

answer is probably no so long as the Mining Law of 1872 is in effect in its present form. Nor do the regulations provide for any kind of penalties. Until they do, many argue that it will be very difficult to achieve a higher rate of compliance. For example, a rancher who strays onto the public's land with a bulldozer while building a road for himself can be fined and/or imprisoned. A prospector who clears all of the vegetation away from a half-acre area and then levels it for drilling or cuts a new road across a mountainside without complying with the regulations is ordered not to do it again, but he is not fined and/or imprisoned.

Similar shortcomings—lack of sufficient authority and of penalties—are anticipated with the BLM regulations.

Spokesmen for the mining industry have argued that federal environmental safeguards are not necessary because the states are doing the job.¹⁰² Indeed, most western states, with the notable exceptions of Arizona and Nevada, do

now have mining reclamation laws. The new Colorado Mined Land Reclamation Act is often cited as an example "of the gravity with which the western states are presently approaching the subject of mined land reclamation."¹⁰³ This Act requires the filing of a notice of intent before exploration activities can be conducted. The notice of intent must be accompanied by a bond securing the reclamation of disturbed surface lands. In addition, the Act requires the issuance of a state permit before mining can take place. Before the mining permit is issued, the applicant's reclamation plan must be approved by the state, and the applicant must post a reclamation bond in an amount set by the state.

Unfortunately industry's view fails to take into account the reality of the situation as it was described by the National Academy of Sciences:

*Most state laws governing surface mining and rehabilitation in the West do not provide for adequate planning, monitoring, enforcement, and financing of rehabilitation. State agencies charged with enforcement are generally understaffed which impairs implementation of the intent of the law.*¹⁰⁴

BLM and Forest Service personnel corroborate this view. In general, the western state agencies charged with enforcing environmental regulations for miners are understaffed and underfunded.

Besides, there is more to environmental safeguards than rehabilitation. Toxic and radioactive materials from mining and milling operations can pollute water systems as well as the air (i.e., through windblown dust from tailings dumps). Hence, ongoing controls of active mining operations are also vitally important.

PUBLIC OWNERSHIP

The current claim-patent system is indeed a last vestige of a former national policy. It is no longer the policy of the United States to dispose of the public domain for the development of agriculture, railroads, or the timber industry as it once was. Why should the government continue to dispose of public domain lands to promote mining? The Congress has declared it the policy of the United States that

the public lands be retained in Federal ownership, unless as a result of the land use planning procedure provided for in this Act [the Federal Land Policy and Management Act], it is determined that disposal of a particular parcel will serve the national interest. . . .¹⁰⁵

No objective reason exists for mining to continue to be an exception to this rule. Adequate incentives can be provided in other ways for

finding and developing hard rock minerals on the public domain without relinquishing public ownership.

FAIR RETURN

The public should receive a fair return for the use of its resources, including hard rock minerals. Royalty payments are the accepted way of achieving this objective. There is no logical reason why the federal government should not collect royalties on hard rock mineral production from the public domain as it already does on production of the same minerals from acquired public lands.

EFFICIENT ALLOCATION OF RESOURCES

Land is an increasingly scarce resource; rent is the traditional way used in our economic system for determining the allocation of scarce land resources among alternative users.

Under the current claim-patent system, this resource is definitely underpriced. It should be remembered that a mining company can build a mill and other structures on the public's land without paying rent. And undervalued land will be used less efficiently than it otherwise would.

A major consequence of the underpricing of land in hard rock exploration and development on the public domain and of the failure to collect royalties on the mineral resources has been to skew the resource allocation system in this area away from mineral development of private lands.¹⁰⁶ In effect, development of federal lands is subsidized—the environmental, land, and other costs are absorbed by the general public rather than being paid by the mining industry and internalized in the price of the minerals. As a consequence, mineral development of private land is more expensive because private landowners are not likely to subsidize mining in these ways. Hence, states which have relatively little public domain land, such as Texas, Arkansas, and Oklahoma, but may have potentially favorable geology could be described as underexplored in terms of hard rock minerals. In addition, as the U.S. Geological Survey has noted, much of the 1,600 million acres of privately owned lands in the nation, mostly in the eastern part of the United States, have "never been adequately appraised" for their mineral potential.¹⁰⁷

Moreover, the subsidization of mineral development leads to mineral prices which do not reflect the full costs of production. Consequently consumers are encouraged to use more of these finite resources than they otherwise would and

to save less than they should. In short, underpricing promotes waste.

Of course, if miners are made to pay for their use of land, water, timber, and other surface resources as well as for the wealth they extract from the ground, as they must on private lands, these costs will eventually be passed on to the consumer. Will they be significant? Probably not because in most manufactured goods the cost of the raw material is only a small fraction of the total cost. Transportation, manufacturing, and marketing costs comprise the bulk. Take bauxite, for example. The recent doubling in the price of bauxite actually translated into 2 or 3 cents per pound in aluminum ingots in the United States—less than 10 percent of the prevailing price. The ingot price is then further diluted as it moves into the price of the finished product. The amount is difficult to calculate but is probably not more than 1 or 2 percent.¹⁰⁸ The economic impact of hard rock minerals is not comparable to energy minerals such as oil and natural gas. And the economy-wide impact of these increased costs would also be minimal. Nonfuel mineral production accounts for only about 1 percent of the nation's Gross National Product. (The addition of uranium raises this figure less than 1 percentage point.) In 1973, with a GNP of roughly 1.2 trillion, the United States used \$36 billion worth of mineral resources, and roughly \$10 billion was for nonfuel materials. Within the total GNP, the dollar and price impacts of hard rock minerals, important as they are, simply are not that large.¹⁰⁹

ENERGY CONSERVATION

The mining and processing of hard rock minerals, especially primary metals, is highly energy consumptive. In fact, primary metals account for about 9 percent of the U.S. total energy demand.¹¹⁰ In view of the nation's continuing energy problems, more efficient use of energy in the primary metals sector could be important and should be a policy concern. The present claim-patent system does not encourage energy efficiency.

Several studies have shown that the best way to save energy in primary metals is through recycling. Almost all the scrap metal which is recycled today comes from metals manufacturers and fabricators or from scrap dealers. Mixed municipal and industrial wastes are largely ignored despite the extensive reserves of primary metal scrap which they contain. It takes 86 percent more energy to mine and process 1 ton of virgin ore for ferrous metal than it does to

mine the city dump for the same resource and reprocess it. Such recovery is technically feasible. In the case of aluminum, it takes 96 percent more energy to mine virgin ore and process it than to recycle from municipal or industrial wastes. For copper it is 91 percent more.¹¹¹

The Environmental Protection Agency estimates the United States could reduce its total energy consumption by 1.5 to 2 percent (roughly the equivalent of 700,000 barrels of oil per day) if the maximum feasible resource recovery were undertaken.¹¹²

A major reason this energy conservation opportunity is being missed is that the metals producing sector of the economy has been stacked in favor of the mining and processing of virgin ore. As EPA noted: "[R]ecently special Federal tax laws favoring mineral extraction (percentage depletion allowances and foreign tax credits) and timber and pulpwood harvesting (capital gains treatment) have reinforced the tendency towards inexpensive virgin raw materials," and there has been heavy "subsidization of mineral exploration" and of "mining and processing research and development."¹¹³ Another key factor is freight rate pricing discrimination, which favors virgin ore over secondary materials. Part of the "heavy subsidization" mentioned by EPA is the free access to surface and mineral resources on the public domain. This definitely constitutes a disincentive to energy-efficient metal recycling.

COMPETITION

In a competitive market, price and output levels are determined at the intersection of supply and demand, and the most efficient level of production as well as the lowest reasonable prices to consumers are thought to result. In this situation the producers of a given commodity cannot affect prices; individual firms are price takers. According to the available economic literature, this desirable state of affairs (desirable, that is, from the consumer's point of view) does not exist in large segments of the hard rock mineral market; major mineral producers tend to be price setters—they can exercise discretionary pricing within certain constraints. (These constraints include operating and capital costs as well as competition from substitutable products.) Such a market is considered oligopolistic. The intersection of supply and demand no longer determines price and output levels—indeed, by definition a supply function does not exist in such a market.

In its study of the U.S. copper industry, for example, Arthur D. Little (ADL) found that seven firms—Anaconda, Kennecott, Phelps Dodge, Inspiration, Magma (a subsidiary of Newmont Mining Corporation), Copper Ranger (owner of White Pine Copper Co. and Quincy Mining Co.), and Asarco are able to exercise "discretionary pricing behavior." The study found that these seven firms accounted for 77 percent of the domestic mine production of copper, 95 percent of the total U.S. copper smelting capacity, and 85 percent of the refining capacity.¹¹⁴

Other studies have indicated that oligopolies exist in other hard rock minerals such as molybdenum, nickel, iron, gypsum, aluminum, and vanadium, to name some but not all.¹¹⁵ It is apparent that there is more than one factor which contributes to the making of such an industry structure. One, for example, is the amount of capital needed to do business; the more that is needed, the harder it is for new firms to enter the market and make it more competitive. ADL estimated that at least \$500 million would be required to develop a new integrated copper operation from mining through refining at the current minimum efficient operating scale (100,000 short tons annually).¹¹⁶

In his study of the iron, nickel, and molybdenum industries, however, economist David Martin found that even more important than the capital requirements in determining oligopolistic structure was the ability of a few companies to gain control of ore reserves. Earlier studies corroborated his findings.¹¹⁷

The Mineral Leasing Act of 1920 sought to reduce the possibility of a few companies doing just that. Under the Act, the amount of land a nonfuel mineral developer may hold under permit (for exclusive prospecting rights) and lease in any one state is restricted to 20,480 acres.

There are no such limitations under the current claim-patent system. Individual mineral companies can and probably do lay claim to tracts of land more extensive than this. No empirical evidence is available to prove that the Mining Law of 1872's lack of limitations reduces competition, but such a conclusion seems to be a reasonable deduction given the evidence which suggests the importance of controlling reserves and the opportunity the Law provides for doing so.

INFORMATION

For better or worse, the federal government is in the minerals business up to its neck. For one

thing, the government holds sizable stockpiles of materials—including many important metals—and how it chooses to manage those stockpiles (to buy or sell) can affect the market. Government tax policies for minerals can affect private investment patterns. So can government tariff policies. And because the supply of minerals is generally inelastic, decisions on production, consumption, or conservation made today by the government may shape mineral supply far into the future.

All of which underscores the government's critical need for information. Should the depletion allowance for uranium be 22 percent and for coal 10 percent? Should the United States tax barite imports to protect domestic producers? Should it subsidize the liquid metal fast breeder reactor on the premise that the nation is running out of economical uranium? These are all very real policy questions. Intelligent decisions on them require timely and comprehensive information. Yet in 1973 the Secretary of Interior reported: "The U.S. Government information base for the conduct of its mineral responsibilities is grossly inadequate."¹¹⁸ A 1976 Office of Technology Assessment study concluded: "The federal systems that government and business leaders rely on for information about raw and processed materials must be improved to help avert future shortages and solve other materials problems."¹¹⁹

The current claim-patent system, even with the new recordation requirements under the Federal Policy and Land Management Act of 1976, is woefully inadequate. There is no requirement that those with claims to valuable mineral deposits on the public domain must report their reserve estimates and production (if any) periodically to the federal government. It is no wonder that so much uncertainty exists regarding the dimensions of the nation's remaining mineral estate, especially in regard to resources such as uranium.

The mineral industry is very secretive, as Payne noted:

*Few sources of good information are available to those outside of the industry who are charged with weighing mineral development potential against other considerations in long-range planning.*¹²⁰

Aside from requiring the full and timely disclosure of mineral reserve data on the public's land, the government has another option for improving its information base: It can accelerate its own mineral exploration efforts. Economist Mason Gaffney argued:

*State and federal agencies should explore underground resources more actively than now, just as they conquered, explored, and surveyed the public lands in the 19th century. . . Public prospecting and disclosure would do much to dispel the aura of mystique which now surrounds exploration. . . The mystique is worth dispelling because it lends itself so nicely, as any plunge into the unknown, to exaggeration and exploitation to claim special privileges.*¹²¹

Both BLM and the Forest Service are currently engaged in elaborate, long overdue land use planning efforts. But a sound long-range plan for any area requires a good base of information about the area's resources—water, wildlife, vegetation, and geology, and huge gaps exist in all of these areas. Adequate geological information is unavailable either because it is privately held or because areas have never been appraised for their mineral potential. According to the U.S. Geological Survey, only about 3 percent of the

nation's public land has undergone a resource appraisal adequate for land planning purposes. Such an appraisal would include reconnaissance for geologic, geochemical, and geophysical mapping but not widespread drilling.¹²²

If the land management agencies possessed better geological information, they could also do a better job of allocating their own limited resources more efficiently. For example, they could give higher priority to the collection of baseline hydrological and biological data in areas which show mineral potential—and thereby be better prepared to deal with the environmental problems which will arise with increased exploration and production. Areas which show very little mineral potential could be temporarily withdrawn from exploration and development so that the management agencies could concentrate on handling the small avalanche of notices of intent and operating plans in the areas which do.

Chapter VII

A Final Word

Two broad conclusions seem to emerge from this analysis.

First, if the present claim-patent system is changed or replaced to meet the policy objectives outlined above, such action will not represent a dramatic or radical break from the past but rather an evolutionary step.

Second, in many respects the public domain

resembles a huge commons. And as Garrett Hardin has demonstrated, the unregulated commons is doomed. "Mutual coercion, mutually agreed upon" is the only practical way to save the commons from its users.¹²³ This means, sad to say, an end to certain frontier freedoms, even for miners.

Acknowledgments

In doing this report, I drew upon a multitude of sources. (See the notes which follow.) I am particularly indebted, however, to four individuals—Erik Rifkin, Larry MacDonnell, Stan Dempsey, and Norm Stark—though, of course, they cannot be held responsible for any of the report's shortcomings.

Erik Rifkin provided a scientific understanding of the potential environmental effects of mineral development. His insights into the shortcomings of the current system's environmental safeguards form a crucial element of the report.

Larry MacDonnell's work on the Mining Law of 1872 was invaluable because it presents a clear analytical framework for thinking through the economic implications of the Law.

Stan Dempsey, by making a very persuasive case for the legal and administrative evolution of the Mining Law, helped me avoid a common pitfall of policy analysts who preceded me, namely, that the Law has not changed since 1872.

Norm Stark, a Forest Service geologist, shared with me his vast knowledge of geology and mineral development in the West. Never has there been a better informed guide.

Lastly, I would like to thank Stan Mahoney, President of All Minerals Corporation, for his sage advice: "It is time we stopped screaming at each other and got on with the job of producing minerals *and* protecting our environment. The country needs both." I hope this report is a step in that direction.

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